

CLAIMS

[1] A metal pattern formed on a surface of a substrate by etching, the metal pattern comprising:

5 a monomolecular film containing fluorinated alkyl chains $(CF_3(CF_2)_n-$, where n represents a natural number), formed on a surface of a metal film composing the metal pattern; and

a masking film formed by penetration of a molecule having a mercapto group ($-SH$) or a disulfide ($-SS-$) group into interstices between molecules composing the monomolecular film.

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[2] The metal pattern according to claim 1, wherein the monomolecular film is formed by adsorption of a silane coupling agent to the surface of the metal film.

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[3] The metal pattern according to claim 1, wherein the monomolecular film is formed by adsorption, or by binding by covalent bond, of a molecule to the surface of the metal film, the molecule having an alkoxysilyl group, a halogenated silyl group, a mercapto group, or a disulfide group ($-SS-$).

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[4] The metal pattern according to claim 1, wherein the molecule having a mercapto group or a disulfide group that composes the masking film is an alkane thiol $(CH_3(CH_2)_nSH$, where n is a natural number), or an alkyl dithiol $(CH_3(CH_2)_qSS(CH_2)_rCH_3$, where q and r are natural numbers, respectively).

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[5] The metal pattern according to claim 1, where the metal pattern has a liquid-dropped trace.

- [6] The metal pattern according to claim 1, wherein
the metal film is formed with at least one metal selected from gold,
silver, copper, platinum, gallium arsenide, and indium phosphide.
- 5 [7] The metal pattern according to claim 1, wherein
the masking film has water-repellent and soil-resistant properties.
- [8] The metal pattern according to claim 1, wherein
10 the substrate is made of a resin.
- [9] The metal pattern according to claim 1, wherein
the metal pattern is a wiring pattern or a decoration-use pattern.
- 15 [10] A metal pattern producing method for forming a metal pattern on a
surface of a substrate by etching, the method comprising the steps of:
forming a monomolecular film containing fluorinated alkyl chains
($\text{CF}_3(\text{CF}_2)_n-$, where n represents a natural number) on a surface of a metal
film;
20 forming a masking film by applying a solution in which a molecule
having a mercapto group ($-\text{SH}$) or a disulfide ($-\text{SS}-$) group is dissolved over a
surface of the monomolecular film so that the molecule having a mercapto
group ($-\text{SH}$) or a disulfide ($-\text{SS}-$) group penetrates in interstices between
molecules composing the monomolecular film; and
25 etching the metal film by exposing the surface of the metal film to an
etching solution so that a portion of the metal film in a region not covered
with the masking film is removed so that the metal pattern is formed.

- [11] The metal pattern producing method according to claim 10, wherein the monomolecular film is formed by adsorption of a silane coupling agent to the surface of the metal film.
- 5 [12] The metal pattern producing method according to claim 10, wherein the monomolecular film is formed by adsorption, or by binding by covalent bond, of a molecule to the surface of the metal film, the molecule having an alkoxysilyl group, a halogenated silyl group, a mercapto group, or a disulfide group (–SS–).
- 10 [13] The metal pattern producing method according to claim 10, wherein the molecule having a mercapto group or a disulfide group that composes the masking film is an alkane thiol ($\text{CH}_3(\text{CH}_2)_n\text{SH}$, where n is a natural number), or an alkyl dithiol ($\text{CH}_3(\text{CH}_2)_q\text{SS}(\text{CH}_2)_r\text{CH}_3$, where q and r are natural numbers, respectively).
- 15 [14] The metal pattern producing method according to claim 10, wherein the masking film is formed by jetting a solution by the ink jet method.
- 20 [15] The metal pattern producing method according to claim 10, wherein the metal film is formed with at least one metal selected from gold, silver, copper, platinum, gallium arsenide, and indium phosphide.
- 25 [16] The metal pattern producing method according to claim 10, wherein after the metal pattern is formed, the surface of the metal film is subjected to a heat treatment at a temperature of 100°C or above, or is exposed to ozone, so that molecules adsorbed to the surface of the metal film are removed.

[17] The metal pattern producing method according to claim 10, wherein the masking film has water-repellent and soil-resistant properties.

5 [18] The metal pattern producing method according to claim 10, wherein the substrate is made of a resin.

[19] The metal pattern producing method according to claim 10, wherein the metal pattern is a wiring pattern or a decoration-use pattern.